

EXERCISE 6.5

Multiply:

1. $(5x + 3)$ by $(7x + 2)$

Solution:

Now let us simplify the given expression

$$(5x + 3) \times (7x + 2)$$

$$5x(7x + 2) + 3(7x + 2)$$

$$35x^2 + 10x + 21x + 6$$

$$35x^2 + 31x + 6$$

2. $(2x + 8)$ by $(x - 3)$

Solution:

Now let us simplify the given expression

$$(2x + 8) \times (x - 3)$$

$$2x(x - 3) + 8(x - 3)$$

$$2x^2 - 6x + 8x - 24$$

$$2x^2 + 2x - 24$$

3. $(7x + y)$ by $(x + 5y)$

Solution:

Now let us simplify the given expression

$$(7x + y) \times (x + 5y)$$

$$7x(x + 5y) + y(x + 5y)$$

$$7x^2 + 35xy + xy + 5y^2$$

$$7x^2 + 36xy + 5y^2$$

4. $(a - 1)$ by $(0.1a^2 + 3)$

Solution:

Now let us simplify the given expression

$$(a - 1) \times (0.1a^2 + 3)$$

$$a(0.1a^2 + 3) - 1(0.1a^2 + 3)$$

$$0.1a^3 + 3a - 0.1a^2 - 3$$

$$0.1a^3 - 0.1a^2 + 3a - 3$$

5. $(3x^2 + y^2)$ by $(2x^2 + 3y^2)$

Solution:

Now let us simplify the given expression

$$(3x^2 + y^2) \times (2x^2 + 3y^2)$$

$$\begin{aligned} & 3x^2 \times (2x^2 + 3y^2) + y^2 \times (2x^2 + 3y^2) \\ & 6x^4 + 9x^2y^2 + 2x^2y^2 + 3y^4 \\ & 6x^4 + 11x^2y^2 + 3y^4 \end{aligned}$$

6. $(\frac{3}{5}x + \frac{1}{2}y)$ by $(\frac{5}{6}x + 4y)$

Solution:

Now let us simplify the given expression

$$\begin{aligned} & (\frac{3}{5}x + \frac{1}{2}y) \times (\frac{5}{6}x + 4y) \\ & \frac{3}{5}x \times (\frac{5}{6}x + 4y) + \frac{1}{2}y \times (\frac{5}{6}x + 4y) \\ & \frac{15}{30}x^2 + \frac{12}{5}xy + \frac{5}{12}xy + \frac{4}{2}y^2 \\ & \frac{1}{2}x^2 + \frac{169}{60}xy + 2y^2 \end{aligned}$$

7. $(x^6 - y^6)$ by $(x^2 + y^2)$

Solution:

Now let us simplify the given expression

$$\begin{aligned} & (x^6 - y^6) \times (x^2 + y^2) \\ & x^6 \times (x^2 + y^2) - y^6 \times (x^2 + y^2) \\ & x^8 + x^6y^2 - x^2y^6 - y^8 \end{aligned}$$

8. $(x^2 + y^2)$ by $(3a + 2b)$

Solution:

Now let us simplify the given expression

$$\begin{aligned} & (x^2 + y^2) \times (3a + 2b) \\ & x^2 \times (3a + 2b) + y^2 \times (3a + 2b) \\ & 3ax^2 + 3ay^2 + 2bx^2 + 2by^2 \end{aligned}$$

9. $(-3d - 7f)$ by $(5d + f)$

Solution:

Now let us simplify the given expression

$$\begin{aligned} & (-3d - 7f) \times (5d + f) \\ & -3d(5d + f) - 7f(5d + f) \\ & -15d^2 - 3df - 35df - 7f^2 \\ & -15d^2 - 38df - 7f^2 \end{aligned}$$

10. $(0.8a - 0.5b)$ by $(1.5a - 3b)$

Solution:

Now let us simplify the given expression

$$\begin{aligned} & (0.8a - 0.5b) \times (1.5a - 3b) \\ & 0.8a(1.5a - 3b) - 0.5b(1.5a - 3b) \end{aligned}$$

$$1.2a^2 - 2.4ab - 0.75ab + 1.5b^2$$

$$1.2a^2 - 3.15ab + 1.5b^2$$

11. $(2x^2y^2 - 5xy^2)$ by $(x^2 - y^2)$

Solution:

Now let us simplify the given expression

$$(2x^2y^2 - 5xy^2) \times (x^2 - y^2)$$

$$2x^2y^2(x^2 - y^2) - 5xy^2(x^2 - y^2)$$

$$2x^4y^2 - 5x^3y^2 - 2x^2y^4 + 5xy^4$$

12. $(x/7 + x^2/2)$ by $(2/5 + 9x/4)$

Solution:

Now let us simplify the given expression

$$(x/7 + x^2/2) \times (2/5 + 9x/4)$$

$$x/7(2/5 + 9x/4) + x^2/2(2/5 + 9x/4)$$

$$2x/35 + (9x^2)/28 + x^2/5 + (9x^3)/8$$

$$9/8x^3 + 73/140x^2 + 2/35x$$

13. $(-a/7 + a^2/9)$ by $(b/2 - b^2/3)$

Solution:

Now let us simplify the given expression

$$(-a/7 + a^2/9) \times (b/2 - b^2/3)$$

$$-a/7(b/2 - b^2/3) + a^2/9(b/2 - b^2/3)$$

$$-ab/14 + ab^2/21 + a^2b/18 - a^2b^2/27$$

14. $(3x^2y - 5xy^2)$ by $(1/5x^2 + 1/3y^2)$

Solution:

Now let us simplify the given expression

$$(3x^2y - 5xy^2) \times (1/5x^2 + 1/3y^2)$$

$$3x^2y(1/5x^2 + 1/3y^2) - 5xy^2(1/5x^2 + 1/3y^2)$$

$$3/5x^4y + 3/3x^2y^3 - x^3y^2 + 5/3xy^4$$

$$3/5x^4y + x^2y^3 - x^3y^2 + 5/3xy^4$$

15. $(2x^2 - 1)$ by $(4x^3 + 5x^2)$

Solution:

Now let us simplify the given expression

$$(2x^2 - 1) \times (4x^3 + 5x^2)$$

$$2x^2(4x^3 + 5x^2) - 1(4x^3 + 5x^2)$$

$$8x^5 + 10x^4 - 4x^3 - 5x^2$$

16. $(2xy + 3y^2)$ by $(3y^2 - 2)$

Solution:

Now let us simplify the given expression

$$\begin{aligned} &(2xy + 3y^2) \times (3y^2 - 2) \\ &2xy(3y^2 - 2) + 3y^2(3y^2 - 2) \\ &6xy^3 - 4xy + 9y^4 - 6y^2 \end{aligned}$$

Find the following products and verify the results for $x = -1$, $y = -2$:

17. $(3x - 5y)(x + y)$

Solution:

Now let us simplify the given expression

$$\begin{aligned} &(3x - 5y) \times (x + y) \\ &(3x - 5y) \times (x + y) \\ &x(3x - 5y) + y(3x - 5y) \\ &3x^2 - 5xy + 3xy - 5y^2 \\ &3x^2 - 2xy - 5y^2 \end{aligned}$$

Let us substitute the given values $x = -1$ and $y = -2$, then

$$\begin{aligned} &(3x - 5y) \times (x + y) \\ &[3(-1) - 5(-2)] \times [(-1) + (-2)] \\ &(-3 + 10) \times (-1 - 2) \\ &7 \times -3 \\ &-21 \end{aligned}$$

$$\begin{aligned} &3x^2 - 2xy - 5y^2 \\ &3(-1)^2 - 2(-1)(-2) - 5(-2)^2 \\ &3 - 4 - 20 \\ &-21 \end{aligned}$$

\therefore the given expression is verified.

18. $(x^2y - 1)(3 - 2x^2y)$

Solution:

Now let us simplify the given expression

$$\begin{aligned} &(x^2y - 1) \times (3 - 2x^2y) \\ &x^2y(3 - 2x^2y) - 1(3 - 2x^2y) \\ &3x^2y - 2x^4y^2 - 3 + 2x^2y \\ &5x^2y - 2x^4y^2 - 3 \end{aligned}$$

Let us substitute the given values $x = -1$ and $y = -2$, then

$$\begin{aligned} &(x^2y - 1) \times (3 - 2x^2y) \\ &[(-1)^2(-2) - 1] \times [3 - 2(-1)^2(-2)] \end{aligned}$$

$$\begin{aligned} &(-2 - 1) \times (3 + 4) \\ &-3 \times 7 \\ &-21 \end{aligned}$$

$$\begin{aligned} &5x^2y - 2x^4y^2 - 3 \\ &[-2(-1)^4(-2)^2 + 5(-1)^2(2) - 3] \\ &-8 - 10 - 3 \\ &-21 \end{aligned}$$

∴ the given expression is verified.

19. $(\frac{1}{3}x - \frac{y^2}{5})(\frac{1}{3}x + \frac{y^2}{5})$

Solution:

Now let us simplify the given expression

$$\begin{aligned} &(\frac{1}{3}x - \frac{y^2}{5}) \times (\frac{1}{3}x + \frac{y^2}{5}) \\ &(\frac{1}{3}x)^2 - (\frac{y^2}{5})^2 \\ &(\frac{1}{3}x - \frac{y^2}{5})(\frac{1}{3}x + \frac{y^2}{5}) \\ &\frac{1}{9}x^2 - \frac{1}{25}y^4 \end{aligned}$$

Let us substitute the given values $x = -1$ and $y = -2$, then

$$\begin{aligned} &(\frac{1}{3}x - \frac{y^2}{5}) \times (\frac{1}{3}x + \frac{y^2}{5}) \\ &(\frac{1}{3}(-1) - \frac{(-2)^2}{5}) \times (\frac{1}{3}(-1) + \frac{(-2)^2}{5}) \\ &(-\frac{17}{15}) \times (\frac{7}{15}) \\ &-\frac{119}{225} \end{aligned}$$

$$\begin{aligned} &\frac{1}{9}x^2 - \frac{1}{25}y^4 \\ &\frac{1}{9}(-1)^2 - \frac{1}{25}(-2)^4 \\ &\frac{1}{9} - \frac{16}{25} \\ &-\frac{119}{225} \end{aligned}$$

∴ the given expression is verified.

Simplify:

20. $x^2(x + 2y)(x - 3y)$

Solution:

Now let us simplify the given expression

$$\begin{aligned} &x^2(x + 2y)(x - 3y) \\ &x^2(x^2 - 3xy + 2xy - 3y^2) \\ &x^2(x^2 - xy - 6y^2) \\ &x^4 - x^3y - 6x^2y^2 \end{aligned}$$

21. $(x^2 - 2y^2)(x + 4y)x^2y^2$

Solution:

Now let us simplify the given expression

$$(x^2 - 2y^2)(x + 4y)x^2y^2$$

$$(x^3 + 4x^2y - 2xy^2 - 8y^3) \times x^2y^2$$

$$x^5y^2 + 4x^4y^3 - 2x^3y^4 - 8x^2y^5$$

22. $a^2b^2(a + 2b)(3a + b)$

Solution:

Now let us simplify the given expression

$$a^2b^2(a + 2b)(3a + b)$$

$$a^2b^2(3a^2 + ab + 6ab + 2b^2)$$

$$a^2b^2(3a^2 + 7ab + 2b^2)$$

$$3a^4b^2 + 7a^3b^3 + 2a^2b^4$$

23. $x^2(x - y)y^2(x + 2y)$

Solution:

Now let us simplify the given expression

$$x^2(x - y)y^2(x + 2y)$$

$$x^2y^2(x^2 + 2xy - xy - 2y^2)$$

$$x^2y^2(x^2 + xy - 2y^2)$$

$$x^4y^2 + x^3y^3 - 2x^2y^4$$

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24. $(x^3 - 2x^2 + 5x - 7)(2x - 3)$

Solution:

Now let us simplify the given expression

$$(x^3 - 2x^2 + 5x - 7)(2x - 3)$$

$$2x^4 - 4x^3 + 10x^2 - 14x - 3x^3 + 6x^2 - 15x + 21$$

$$2x^4 - 7x^3 + 16x^2 - 29x + 21$$

25. $(5x + 3)(x - 1)(3x - 2)$

Solution:

Now let us simplify the given expression

$$(5x + 3)(x - 1)(3x - 2)$$

$$(5x^2 - 2x - 3)(3x - 2)$$

$$15x^3 - 6x^2 - 9x - 10x^2 + 4x + 6$$

$$15x^3 - 16x^2 - 5x + 6$$

26. $(5 - x)(6 - 5x)(2 - x)$

Solution:

Now let us simplify the given expression

$$\begin{aligned} &(5 - x)(6 - 5x)(2 - x) \\ &(x^2 - 7x + 10)(6 - 5x) \\ &-5x^3 + 35x^2 - 50x + 6x^2 - 42x + 60 \\ &60 - 92x + 41x^2 - 5x^3 \end{aligned}$$

27. $(2x^2 + 3x - 5)(3x^2 - 5x + 4)$

Solution:

Now let us simplify the given expression

$$\begin{aligned} &(2x^2 + 3x - 5)(3x^2 - 5x + 4) \\ &6x^4 + 9x^3 - 15x^2 - 10x^3 - 15x^2 + 25x + 8x^2 + 12x - 20 \\ &6x^4 - x^3 - 22x^2 + 37x - 20 \end{aligned}$$

28. $(3x - 2)(2x - 3) + (5x - 3)(x + 1)$

Solution:

Now let us simplify the given expression

$$\begin{aligned} &(3x - 2)(2x - 3) + (5x - 3)(x + 1) \\ &6x^2 - 9x - 4x + 6 + 5x^2 + 5x - 3x - 3 \\ &11x^2 - 11x + 3 \end{aligned}$$

29. $(5x - 3)(x + 2) - (2x + 5)(4x - 3)$

Solution:

Now let us simplify the given expression

$$\begin{aligned} &(5x - 3)(x + 2) - (2x + 5)(4x - 3) \\ &5x^2 + 10x - 3x - 6 - 8x^2 + 6x - 20x + 15 \\ &-3x^2 - 7x + 9 \end{aligned}$$

30. $(3x + 2y)(4x + 3y) - (2x - y)(7x - 3y)$

Solution:

Now let us simplify the given expression

$$\begin{aligned} &(3x + 2y)(4x + 3y) - (2x - y)(7x - 3y) \\ &12x^2 + 9xy + 8xy \\ &12x^2 + 9xy + 8xy + 6y^2 - 14x^2 + 6xy + 7xy - 3y^2 \\ &-2x^2 + 3y^2 + 30xy \end{aligned}$$

31. $(x^2 - 3x + 2)(5x - 2) - (3x^2 + 4x - 5)(2x - 1)$

Solution:

Now let us simplify the given expression

$$(x^2 - 3x + 2)(5x - 2) - (3x^2 + 4x - 5)(2x - 1)$$

$$\begin{aligned} &5x^3 - 15x^2 + 10x - 2x^2 + 6x - 4 - (6x^3 + 8x^2 - 10x - 3x^2 - 4x + 5) \\ &5x^3 - 6x^3 - 15x^2 - 2x^2 - 5x^2 + 16x + 14x - 4 - 5 \\ &- x^3 - 22x^2 + 30x - 9 \end{aligned}$$

32. $(x^3 - 2x^2 + 3x - 4)(x - 1) - (2x - 3)(x^2 - x + 1)$

Solution:

Now let us simplify the given expression

$$\begin{aligned} &(x^3 - 2x^2 + 3x - 4)(x - 1) - (2x - 3)(x^2 - x + 1) \\ &x^4 - 2x^3 + 3x^2 - 4x - x^3 + 2x^2 - 3x + 4 - (2x^3 - 2x^2 + 2x - 3x^2 + 3x - 3) \\ &x^4 - 3x^3 + 5x^2 - 7x + 4 - 2x^3 + 5x^2 - 5x + 3 \\ &x^4 - 5x^3 + 10x^2 - 12x + 7 \end{aligned}$$



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